

What we claim as new and desire to secure by Letters Patent is:

1. An automated cut and restart apparatus to form a composite laminated structural shape having at least one deposited surface layer of resin impregnated tape formed with continuous fibers
5 selected from the group consisting of ceramics, metals, carbon glass compositions and organic polymers which have been preimpregnated with a resin binder and provided with a releasable backing layer comprising:

(a) a laterally moving head member to
10 continuously apply the resin impregnated tape to the surface of said structural shape with compaction roller means, said head member further having a pair of operationally cooperating mechanisms to first remove the backing layer from the reinforcement tape
15 while being continuously fed to the structural shape and thereafter sever a predetermined length of the unbacked tape from a tape supply while still being continuously fed,

(b) said backing layer removal mechanism
20 having means enabling separation of said backing layer from the tape while further continuously accumulating the removed backing layer,

(c) said tape severing mechanism including mechanical cutter means which cooperate with pinch
25 roller means enabling forward tape movement when being fed while preventing backward tape movement during tape severance with said cutter means, and

30 (d) associated electrical control means to operate said head member in an automated sequential manner.

5 2. The apparatus of claim 1 wherein said head member is automatedly moved forward from a start position to apply a first strip of said resin impregnated tape to the structural shape then moved to a next said start position for placement of another strip as directed by said associated electrical control means.

3. The apparatus of claim 1 wherein the resin impregnated tape being employed is manually fed to the head member before automated operation is initiated.

4. The apparatus of claim 3 wherein the resin impregnated tape being employed is also manually trimmed before automation operation is initiated.

5. The apparatus of claim 1 wherein the resin impregnated tape being employed is supplied from a spool incorporated in said head member.

6. The apparatus of claim 5 wherein the spool includes a friction braking mechanism.

7. The apparatus of claim 1 wherein the backing layer being removed is accumulated with a motorized spool incorporated in the head member.

5

8. The apparatus of claim 1 wherein the cutter means severs the predetermined length of unbacked resin impregnated tape in a direction substantially perpendicular to the tape feed direction.

9. The apparatus of claim 7 wherein the cutter means severs the predetermined length of unbacked resin impregnated tape in a bias direction with respect to the tape feed direction.

10. The apparatus of claim 1 wherein the cutter means employs a knife edge.

11. The apparatus of claim 10 wherein the cutter means further includes a moving blade.

12. The apparatus of claim 11 wherein the cutter means employs a rotating disc blade.

13. The apparatus of claim 1 wherein the associated electrical control means includes a program controller.

14. The apparatus of claim 13 where in the program controller comprises a software programmed computer.

15. An automated cut and restart method to form a composite laminated structural shape having at least one deposited surface layer of applied tape formed with continuous fibers selected from the group

5 consisting of ceramics, metals, carbon, glass
compositions and organic polymers which have been
preimpregnated with a resin binder and provided with a
releasable backing layer which comprises:

10 (a) first removing the backing layer
from the tape being employed while being continuously
transported by a laterally moving tape laying member
from a predetermined start position,

15 (b) continuously moving the unbacked tape to
the structural shape receiving the applied tape
employing pinch roller means incorporated in said tape
laying member,

 (c) depositing a predetermined length of the
moving unbacked tape on the top surface of said
structural shape with compaction roller means,

20 (d) severing the predetermined length of
deposited tape from a tape supply with mechanical
cutter means which cooperate operationally with said
pinch roller means to permit forward movement of the
tape being continuously fed while preventing backward
25 tape movement during tape separation, and

 (e) returning the tape laying member to the
next start position all with associated electrical
control means.

16. The method of claim 15 wherein the
pinch roller means in the tape laying member are
motorized to supply the tape being employed.

17. The method of claim 15 wherein the tape transport further utilizes a motorized spool in the tape laying member to rewind the backing layer being removed.

18. The method of claim 15 wherein the tape laying member includes a pair of operationally associated spools to continuously supply the tape being employed while continuously accumulating the backing tape after removal.

5

19. The method of claim 18 wherein the spool supplying tape includes a friction braking mechanism.

20. The method of claim 15 wherein the automated cut and restart procedure is conducted with a program controller.

21. The method of claim 15 wherein the associated electrical control means includes a software programmed computer.

22. The method of claim 15 wherein the operational movement at which the head member is controlled does not exceed the speed at which the backing layer is removed.

23. The method of claim 15 wherein the compaction roller means is moved along the length of already deposited unbacked tape to apply additional compressive action.